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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/007,719	11/09/2001	John C. Tsai	60617.300901	8874

32112 7590 03/19/2003

INTELLECTUAL PROPERTY LAW OFFICE
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EXAMINER

CONNELLY CUSHWA, MICHELLE R

ART UNIT PAPER NUMBER

2874

DATE MAILED: 03/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/007,719

Applicant(s)

TSAI ET AL.

Examiner

Michelle R. Connelly-Cushwa

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8,11-23,25,28-39,42-53 and 56-60 is/are rejected.
- 7) ☒ Claim(s) 7,9,10,24,26,27,40,41,54 and 55 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on January 31, 2002 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

Twenty-six (26) sheets of formal drawings were filed on November 9, 2001 and have been accepted by the Examiner.

Specification

The disclosure is objected to because of the following informalities: The abstract contains more than 150 words.

Applicant is reminded of the proper format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 32-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 32; the claim recites "the de-multiplexing system of claim 32" in line 1 of the claim. Claim 32 cannot depend from itself. Appropriate correction is required.

Regarding claims 33 and 34; the claims inherently contain the deficiencies of any base or intervening claims from which they depend.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 8, 11-23, 25, 28-39, 42-53 and 56-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grann et al. (US 6,212,312 B1).

Regarding claims 1-6, 8, 11-13, 35-39 and 42-44; Figure 3 of Grann et al. discloses a multiplexing system comprising:

- at least two input light beams each having respective light wavelengths (λ_1 , λ_2 , λ_3 , λ_4 , λ_5); and
- a multi-dimensional grating suitable for receiving the input light beams (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) and diffracting at least one of the light wavelengths to form a single output light beam ($\lambda_1, \lambda_2, \lambda_3, \lambda_4, \dots, \lambda_n$), thereby

multiplexing the light wavelengths such that they are present in the output light beam;

- wherein one of the light wavelengths may be a principal wavelength (λ_2 , λ_3 , λ_4 or λ_5), and another of the light wavelengths is a diffractable wavelength (λ_1 , λ_2 , λ_3 or λ_4), such that the principal wavelength is received and passed through a portion of the grating and the diffractable wavelength is received and combined with the principal wavelength;
- wherein the principal wavelength may be a plurality of wavelengths (λ_2 , λ_3 , λ_4 or λ_5), thereby producing the output light beam with an addition of a diffractable wavelength (λ_1) into the plurality of wavelengths;
- wherein the multi-dimensional grating has characteristics suitable for diffracting a plurality of wavelengths concurrently;
- wherein the multi-dimensional gratings is a cubical grating formed by an array of planar gratings (10a, 10b, 10c, 10d, 10e);
- wherein the multiplexing system includes a plurality of multi-dimensional gratings (10a, 10b, 10c, 10d, 10e) and includes a plurality of input light signals (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) such in number that each multi-dimensional grating has at least one input light signal providing its respective wavelength to that multi-dimensional grating; and

- wherein the plurality of multi-dimensional gratings (10a, 10b, 10c, 10d, 10e) are physically discrete and integrated into one contiguous physical unit.

Grann et al., however, does not specifically disclose at least two light sources or at least one light source that provides multiple wavelengths. In column 3, lines 45-54, however, Grann et al. teaches that multiplexing is the conversion of multiple signals to signals transmitted by a single channel. The multiple signals (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) are inherently provided by light sources. Light sources that produce either single or multiple wavelengths are well known and commonly used in the art to produce optical signals for optical networks that include multiplexers and demultiplexers. Therefore, one of ordinary skill in the art would have found it obvious to use either multiple or single light sources to generate the multiple light signals (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) in the invention of Grann et al., since the light signals must inherently be provided by a light source; Grann et al. does not disclose that any specific light source is to be used; the practice of selecting appropriate light sources to provide light signals is very elementary and within the level of ordinary skill in the art; and it appears that the invention would perform equally well regardless of the specific light sources used to provide the signals.

Regarding claims 14-17 and 45-48; Grann et al. teaches all of the limitations of these claims as applied above. The multiplexing system disclosed in Figure 3 of Grann et al. includes:

- input light beams (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) comprising a plurality of wavelengths of light;
- a plurality of multi-dimensional gratings (10a, 10b, 10c, 10d, 10e) suitably arranged to form at least one and as many as three input grating blocks and an output grating block;
- wherein the input grating blocks are suitably arranged to receive one of the input light beams and to diffractably provide its wavelength or wavelengths to the output grating block;
- wherein the output grating block is suitably arranged to receive the wavelengths from the input grating blocks and to diffractably combine the wavelengths such that they are present in the output light beam;
- wherein the multi-dimensional gratings (10a, 10b, 10c, 10d, 10e) are planar gratings and two input grating blocks provide wavelength sets to the output grating block; and
- wherein the gratings in the output grating block are cubical gratings, formed from two or more of the planar gratings, and two, three or more of the input grating blocks provide the wavelength sets to the output grating block.

Grann et al., however, does not disclose that at least two light sources that provide the input beams have respective wavelength sets comprising a plurality of wavelengths are to be used. The signals (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) are inherently provided by light sources. Light sources that produce either single or multiple wavelengths are well known and commonly used in the art to produce optical signals for optical networks that include multiplexers and demultiplexers.

Therefore, one of ordinary skill in the art would have found it obvious to use one or more of either light sources that produce single light wavelengths or light sources that produce multiple light wavelengths to generate the multiple light signals (λ_1 , λ_2 , λ_3 , λ_4 , λ_5) in the invention of Grann et al., since the light signals must inherently be provided by a light source; Grann et al. does not disclose that any specific light source is to be used; the practice of selecting appropriate light sources to provide light signals is very elementary and within the level of ordinary skill in the art; and it appears that the invention would perform equally well regardless of the specific light sources used to provide the signals. Thus, one of ordinary skill in the art would have found it obvious to use two or more light sources, wherein each light source provides input light beams having respective wavelength sets comprising a plurality of wavelengths of light in the invention of Grann et al.

Regarding claims 18–23, 25, 28-34, 49-53 and 56-60; Grann et al. discloses all of the limitations of claims 18-20 as applied above. The system disclosed in Figure 3 of

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Grann et al. also functions as a de-multiplexing system, wherein a light beam (λ_1 , λ_2 , λ_3 , λ_4 ,..... λ_n) containing multiple wavelengths is input into the grating and principal wavelengths are passed through portions of the grating, while diffracted wavelengths are diffracted to form output light beams, thereby de-multiplexing the light wavelengths into respective output light beams (λ_1 , λ_2 , λ_3 , λ_4 , λ_5).

Allowable Subject Matter

Claims 7, 9, 10, 24, 26, 27, 40, 41, 54 and 55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art cited on attached form PTO-892 is the most relevant prior art known, however, the invention of claims 7, 9, 10, 24, 26, 27, 40, 41, 54 and 55 distinguishes over the prior art of record for the following reasons.

Regarding claims 7 and 24; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a multiplexing system as defined in claim 7 or a de-multiplexing system as defined in claim 24, wherein the planar grating is optically two-dimensionally asymmetrical; and the light wavelengths are each respectively diffracted by the planar grating with respect to one asymmetric dimension.

Regarding claims 9 and 26; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a multiplexing system as defined in claim 9 or a de-multiplexing system as

defined in claim 26, wherein the cubical grating is optically two-dimensionally asymmetrical; and the light wavelengths are each respectively diffracted by the cubical grating with respect to one asymmetric dimension.

Regarding claims 10 and 27; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a multiplexing system as defined in claim 10, wherein the cubical grating is optically three-dimensionally asymmetrical; and the light wavelengths are each respectively diffracted by the cubical grating with respect to one asymmetric dimension.

Regarding claims 40 and 54; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a method as defined in claim 40 or in claim 54, wherein the step (b) includes concurrently diffracting two said light wavelengths respectively with optical two-dimensional asymmetry in the multi-dimensional grating.

Regarding claims 41 and 55; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a method as defined in claim 41 or in claim 55, wherein the step (b) includes concurrently diffracting three said light wavelengths respectively with optical three-dimensional asymmetry in the multi-dimensional grating.

Hence, there is no reason or motivation for one of ordinary skill in the art to use the prior art of record to make the invention of claims 7, 9, 10, 24, 26, 27, 40, 41, 54 and 55.

Conclusion

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Matsuda (US 6,404,947) discloses a de-multiplexer comprising a three-dimensional grating in Figure 3; Barenburg et al. (US 2003/0026515) discloses a tunable multiplexer and de-multiplexer including gratings; Adar et al. (US 5,195,161) discloses an optical waveguide including Bragg grating coupling means; Friesem et al. (US 6,215,928 B1) discloses active wavelength selection with resonant devices including gratings; Zhou (US 6,490,393 B1) discloses an integrated multiplexer and de-multiplexer using gratings; Jordan et al. (US 6,522,795 B1) discloses a tunable etched grating for WDM optical communication systems; Lizet et al. (US 4,740,951) discloses a multiplexing and de-multiplexing device using optical gratings; and Park et al. (US 6,101,302) discloses a grating-assisted vertical coupler.

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (703) 305-5327. Any

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inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956 or to the technical support staff supervisor at telephone number (703) 308-3072.

Michelle R. Connelly-Cushwa

MRCC

March 13, 2003


Akim E. Ullah
Primary Examiner